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Biog Address
by
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National Aeronautics and Space Administration

Rose Polytechnic Institute
Terre Haute, Indiana

Rose Polytechnic Institute has set its vision on a decade of development that will mark the final years of its first century of progress. This is a most commendable way to approach your Centennial in 1974. It fixes the aspiration of this Institute on a future of growth, and it constitutes a vigorous tribute to the past. In this way your first hundred years will not end passively, but rather will be celebrated as part of the process of constant renewal that is a mandatory condition of education and the democratic system.

The solutions to problems that face this Institute and our world in the next ten years must consider a new dimension. This new dimension is the rapidly increasing rate of technological change which is already evident by the great outpouring of scientific and technological innovation, and which now offers unlimited promise and demands the strongest action based on a dedication to utilize the new forces of change to preserve the old and proven values of our society.

Ninety years ago when this school was founded, its teachers and its students illuminated their rooms with oil lamps, used wood to heat their homes and traveled mostly in horse-drawn vehicles. Those conditions had prevailed for almost 3,000 years. The milestones since then have passed rapidly. They are still accelerating. They have led to change in man's every thought and every undertaking.

In the lifetime of a child not yet out of the first grade, this Nation has come from its first manmade earth

satellite to multi-manned flights in earth orbit, to deep space investigations, to close-up pictures of the moon, to vast new concepts of the cosmic environment in which our planet revolves, and to the ability to overcome gravity and carry our pursuit of knowledge and utility beyond the near-earth regions to which all men in past ages have been restricted.

A reasoned response by a great nation to a challenge as massive as space does not come easily. It must find its tools in an industrial complex that is willing to undertake new methods with new materials. It must find its theories and its limitations on university campuses and in the scientific community. It must be formulated by a concerned and a courageous government. And, above all, it must find its purpose in a national will that accepts this new opportunity as a new means to national greatness.

In this country, we have seen emerge the requirements of national leadership, industrial know-how,

academic excellence and an enlightened public. Three Presidents have furnished the space program inspired leadership. Four Congresses have given its bipartisan support. American industry has accepted unprecedented reliability standards for spacecraft, rocket boosters, control devices, communications equipment, and fuels. Universities have contributed in an outstanding way to the needs for research and leadership. And the American people have reacted with the same vision and determination that won them mastery of this land and carried this Nation to its present position of leadership in the Free World.

The opportunities offered by space are known to this Institute. One of your distinguished graduates, and a native of Terre Haute, Dr. Abe Silverstein, is in this audience. Dr. Silverstein is one of the chief founders and planners of our National Aeronautics and Space Program. He is the director of the Lewis Research Center in Cleveland where scientists and engineers are shaping much of our aviation and space future. He is a gifted scientist and a rare administrator. And, I believe, Dr.

Logan, that something Dr. Silverstein said recently is a direct and significant contribution to your efforts to broaden the liberal education offered to your scientists and engineers. He said, "Change is the basic continuing dynamic of the universe...We are not privileged to accept or reject it. It occurs. Progress then is not just a growth of technological skills and material wealth. It is an advancement toward excellence in every aspect of our lives and a striving toward a culture and civilization that will recognize both the grandeur of the universe and the dignity of man".

In a recent presentation to NASA project managers, Dr. Silverstein reminded his listeners, "We must be concerned with the human mind and its education. We must be concerned with human dignity and its opportunity."

In agreement with the philosophies expressed in these quotations, NASA has undertaken both qualitative and quantitative action. It is a basic NASA premise that in carrying out the primary mission of the space

program the Nation shall have at the same time the benefit of every additional advantage that can be derived from space exploration.

Among those advantages, none is more important than the Space Agency's participation in the Nation's efforts to strengthen its educational institutions.

NASA's orientation is to the specific objectives assigned to it by Congress in the Space Act of 1958. As a consequence, the Space Agency has no charter to sponsor basic research except as it is related to its responsibilities. Within those responsibilities, however, and they are broad enough to touch on almost every scientific discipline, NASA is exerting every effort to encourage conditions that are conducive to research within the natural home of science--the university--and to do so on a broad basis throughout the country.

Indeed, the success of the national space program depends to a very large degree on the quality and the extent of involvement by the universities. Their most

important contribution would naturally be in doing the jobs that are uniquely qualified to do, that is, in research and in educating and training at both the undergraduate and graduate levels the scientists, engineers, and other professional personnel required by the space program.

Therefore, NASA looks to institutions of higher learning in critical areas: we make contract and grant arrangements with universities and groups of scholars in universities to cover basic research needs. In most instances, the experiments carried aboard NASA spacecraft are conceived and designed by scientists and engineers within the university community. Those which are flown are selected by NASA on the basis of comparative value, with the advice and counsel of recognized authorities in the applicable scientific disciplines.

NASA recognizes that the conduct of space-related research by multidisciplinary teams within the universities and the training of scholars in space-related fields have

opened increased opportunities and increased the requirements for university research facilities. As a consequence, we have established a program of facilities grants, to provide additional laboratory space for space-related activities in institutions which are unusually active in the conduct of NASA research. Funds are provided in those instances where active programs are already under way, where it is clear that additional facilities can support further efforts.

But NASA is also aware that the Nation requires an increasing supply of highly trained scientists and engineers. It must look to the universities for expansion to fill this need. The very fact that so much of NASA's basic research is performed in the universities stimulates doctoral and post-doctoral training. Therefore, the NASA pre-doctoral training program was started in 1962 with grants to 100 students in ten universities. It has grown each year. Our hope is to assist in developing 1,000 doctorates annually. This

fall there will be 3,132 students studying for their Ph.D.'s under NASA programs in 142 universities located throughout the 50 states.

In NASA we place heavy emphasis on the development of the university as an institution because only there are we developing the manpower that will sustain the Nation's ability to derive maximum benefits from the great new resources that are now opening to us. Two other partners in U.S. space activity are government and industry. But in government and industry we are using manpower, while developing it only to a limited degree. Many have come to believe that the greatest return from federal investment in research projects at universities is not the results of that research, important though they are, but rather the values added to the training of the graduate students in those institutions.

With its university program, the National Aeronautics and Space Administration is approaching a goal established early in its history. That goal, when

achieved, will provide a substantial increment to those trained men who are capable of guiding this country's undertakings in science and technology confidently toward future needs that are only partially visible to us now. That goal is being pursued in institutions of higher learning where men teach and practice their specialties in the context of other highly refined fields of interest. Surely, this concept is broader than the space program itself. We often hear our times described as the age of the specialist. And insofar as this description denotes intense application of talent to a given area, it is certainly valid. But the problems that confront our society will not submit to specialists working in isolation from each other. We have come to a point in time when complexity demands a new melding of disciplines. The engineer cannot discharge his responsibilities without the counsel of the scientist. The industrialist cannot succeed without the economist. The government does not

undertake solutions to problems without the counsel of the universities.

Even as you at Rose Polytechnic seek ways to equip your specialists with the broader knowledge of liberal education, so the National Aeronautics and Space Administration seeks to encourage the broadest approach to its missions by inviting participation from all qualified sources. This policy is written into every research facilities grant between NASA and a participating university. The Memorandum of Understanding that is signed by both parties reads, in part: "...The National Aeronautics and Space Administration is particularly desirous that the environment in which space research is conducted and its full benefits realized will be characterized by a multidisciplinary effort which draws upon creative minds from various branches of the sciences, technology, commerce and the arts."

This is not the only goal NASA is approaching. Seventy-five days from now, if all goes well, the space-

craft Mariner IV will transmit to earth information about Mars that will be a valuable contribution to our knowledge of our solar system. Mariner has been on its way since November 28, 1964.

Tomorrow you will have opportunity to see the first television transmissions from Europe on a fully commercial satellite. That satellite is a direct descendant of the research and development communications satellites placed in orbit by NASA.

In a few weeks the second of our manned Gemini flights is scheduled to be launched to add knowledge of man's role in space exploration.

A few days ago the highest steel was erected in man's largest structure. This took place at NASA's field center at Cape Kennedy. It is in this building that the launch vehicle and spacecraft will be assembled for the first American manned flight to the moon. The first stage engines for that momentous flight were successfully tested this spring.

Already the Defense Department has established an operational communications system by satellite. Already bioscience, physics, astronomy, chemistry, navigation, geophysics, and meteorology have expanded their frontiers by knowledge that space has yielded to us.

You here at Rose Polytechnic are inaugurating a great new decade in your history. You are preparing to play a role of greater significance in the future. You are thus symbolic of much that is happening in this country. Your hope is to offer greater resources to a great society that among other worthwhile programs is now boldly starting to solve such fundamental problems as poverty, disease and hunger.

The National Aeronautics and Space Administration shares in your hope and believes, with you, that our Nation will move with great confidence into a future that offers unlimited aspirations for all its people.

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